

Chapter 4: Environmental Consequences

Introduction

NEPA requires that an EIS analyze and disclose a proposed action's direct, indirect, and cumulative effects (40 CFR 1508.25 (c)). Cumulative impacts are those resulting from the combination of the proposed action and other past, present, or reasonably foreseeable actions with the potential to impact the same resources (40 CFR 1508.7). In this analysis, several foreseeable actions by the Forest Service or permitted by the Forest Service could cause an increase in the winter recreational use of the permit area. These actions are identified and discussed below. There are a number of other winter recreational and noise-generating activities that occur in the permit area, creating the potential for overlapping uses or impacts. Some of these, such as general road traffic, other aircraft, and avalanche control for the ski area, highway, and railroad are outside the control of the Forest Service. These effects are disclosed throughout this chapter.

Impact Assessment

The results of NEPA analysis should clearly contrast the direct, indirect, and cumulative environmental impacts of the proposed action and alternatives. Many of the impacts of heli-skiing are difficult to assess or quantify because some tend to be subjective (e.g., recreational conflicts) while others have not been well studied or documented (e.g., helicopter impacts on some wildlife species). To facilitate comparison of alternatives, the impact discussions below are organized as follows:

- The three issues in Chapter 1 (Public Involvement and Issues to be Considered) are restated under each topic below. These issues are discussed in the order presented. Each issue analysis discusses anticipated impacts, and concludes with the effects of the proposed action and alternatives.
- Disclosure of impacts to air quality, soil and water, vegetation and sensitive plants, heritage resources, roadless areas, wild and scenic rivers, economics, and environmental justice are addressed at the end of the chapter.
- Unavoidable adverse impacts and irreversible and irretrievable commitments of resources as required by NEPA are addressed at the end of the chapter.

Stipulations have been included in the action alternatives to protect wildlife from disturbances associated with heli-skiing activities, and reduce conflicts with other winter recreational users and local residents. In addition, several mitigation measures have been designed to address these issues. In evaluating potential impacts, it is assumed that all mitigation measures listed in Chapter 2 are in place.

Other On-going or Potential Projects

Any action that results in more people in the backcountry or more disturbances of natural habitats in or near the permit area has the potential to cause cumulative impacts to wildlife, winter recreationists, and local residents. These projects, ongoing and potential, are summarized in Chapter 3 and the effects are disclosed later in this chapter.

Wildlife Impacts (Issue 1)

Issue Statement

The noise and visual disturbance of the helicopter and the physical presence of heli-skiers has the potential to disturb wildlife. Factors include the distance to the disturbance, sensitivity of individual species to noise, and level of habituation (becoming accustomed to). Identified wildlife concerns centered on brown bears, Dall's sheep, mountain goats, and wolverines, but effects on other wildlife species were also raised. Specific concerns included direct or indirect displacement of individuals by the helicopter or by heli-skiers, disruption of behavior, disturbance of animals on wintering areas or around potential denning sites, and harm to overall health, growth rates, and reproductive success.

Wildlife in this EIS is addressed at two levels: (1) general wildlife and (2) individual species including: (a) federally listed threatened and endangered species and Forest Service Region 10 sensitive species, (b) Forest Service management indicator species, (c) species of special interest, and (d) other species of concern that may be affected by this proposal. Effects include: (1) direct effects of the project (disturbance to wildlife from helicopter flights and heli-skiers); (2) indirect effects (potential changes in animal behavior or movement patterns as a result of disturbance, and the associated changes in predator/prey interactions); and (3) cumulative effects (effects on wildlife from heli-skiing along with other winter recreation activities). Much of this information is taken from the *Wildlife Specialist Report* prepared for this project by Forest Service Wildlife Biologists Michael I. Goldstein, Mary Ann Benoit, William Shuster and Aaron J. Poe (USDA-Forest Service 2003a).

General Wildlife Effects

Direct Effects

Several reports have been written to document heli-skiing impacts on wildlife on the Chugach National Forest (e.g. USDA Forest Service 1999a, 2002b, 2002d). The principle sources of impacts associated with heli-skiing are helicopter overflights, takeoffs and landings, and skiing near wildlife. Proximity and frequency of these disturbances determine the likelihood of human consequences. The sound and visual stimuli of overflights can affect the physiology and behavior of wildlife. If stress becomes chronic, it can negatively affect an animal's fitness and long-term survival (USDI-National Park Service 1994). The manner and degree to which overflights influence wildlife depends on each species' life history, characteristics of the aircraft and flight activities, and other factors including habitat, season, activity time of exposure, sex, age, health, and previous experience with aircraft (USDI-National Park Service 1994). Reactions to overflights can vary according to the tolerances of individual animals. The relationship between overflights and impacts to wildlife is complex, but one recognized generality is that the closer the aircraft, the more likely an animal will be stressed (Altmann 1958, Berger et al. 1983, Krausman and Hervert 1983, Knight and Knight 1984, Miller and Smith 1985, Krausman et al. 1986, Stockwell et al. 1991).

The helicopter itself triggers most documented wildlife impacts associated with heli-skiing. Although there has been little published research on the impacts of heli-skiers to

wildlife, logic and experience indicates that the physical presence of skiers creates a disturbance to wildlife and often results in behavior modification, displacement, and/or increased energy expenditure. When combined with other factors such as stressful winters, this could result in increased mortality or reduced productivity.

Responses to overflights can range from indifference to extreme panic (USDI-National Park Service 1994). Behavior can vary among species, and even among individuals within a species. Escape flight is the most common response. Behavioral reactions can cause injury and influence breeding success, feeding, and habitat use. Accidental injury can result from trampling, falling, running into objects or off cliffs. Reproductive losses can occur when young or eggs are trampled, left unattended, or abandon. Panicked running or flying results in increased energy use, and reduced food intake if the animal happens to be feeding.

Indirect Effects

Physiological responses such as increased heart rate or stress hormone levels have been demonstrated, but whether such response lead to long-term harm is equivocal (McArthur et al. 1982, USDA-Forest Service 1992, USDI-National Park Service 1994). Combined with other events such as breeding, nursing young, or harsh winters, the impacts of physiological stress can be more severe.

There is some evidence that human activities that compact snow (e.g. tour skiers, skate skiers, snowmachine users) provide easy travel routes for predators such as wolves, wolverines, and coyotes, in areas that would other wise be difficult to reach in deep snow. Changes in species composition may result from these accessible travel routes and could result in competition for food and /or pressure for species such as wolverine, lynx, and marten that would otherwise not occur. Heli-ski runs, however, are not likely to constitute compacted snow trails that could be used by predators. The runs are isolated segments of snow that could not be accessed by a competitor species, and it is unlikely that a pass over the snow by a heli-skier would compact the snow sufficiently to allow an animal to walk where it otherwise could not.

Cumulative Effects

Abundance and distribution of the many species discussed in this EIS have been most influenced by alterations of their habitats and by disturbance from activities, such as past mining and timber harvest, past and current residential and commercial developments, past and current outdoor recreational activities, and for some species, hunting and trapping (USDA-Forest Service 2002b). Any action that results in more people in the backcountry or more disturbances of natural habitats in or near the permit area has the potential to cause cumulative impacts to wildlife.

The proposed heli-skiing operation would add cumulatively to the human disturbances of wildlife populations. These disturbances include both motorized and non-motorized recreation as discussed in the Background Information section above.

General road traffic, snowmachines, other aircraft, and avalanche control for the ski area, highway, and railroad also contributes to the noise disturbance of wildlife. However, with the required mitigation in place, the generally small incremental increase

attributable to heli-skiing would not trigger any qualitative increase in impacts. On the other hand, not authorizing heli-skiing would not substantially reduce wildlife impacts because of continued use of these areas by other winter recreationists (for example, Mt. Ascension and Seattle Creek would still be heavily used by snowmachine users and ski tourers).

Comparison of Alternatives

Under Alternative 1, No Action, CPG's permit would not be issued and no commercially guided helicopter skiing would occur on the Kenai Peninsula geographic area unless another permit was applied for and granted. As a consequence, there would be no impacts to wildlife from commercial helicopter skiing activities. However, private groups or individuals could still rent a helicopter or fixed wing aircraft and ski the area without a permit. The Forest Service does not control aircraft use or flight paths over the Chugach National Forest, and aircraft used for other purposes could disturb wildlife. Other forms of winter recreational activities will continue and will likely increase in the future. Because of noise level and mobility, snowmachine users have the potential to have the greatest impact. Terrain and accessibility limit the extent of disturbance by these activities to some degree. However, human activity of any kind in the vicinity of important habitat would likely cause a disturbance to wildlife.

One may make the assumption that the action alternative that impacts the least number of acres would impact the least number of individual wildlife, and the alternative that provides for the least number of client days would have a lessening degree of the overall effect on wildlife. If this was true, then the alternatives would range from least impacting to potentially more impacting in the following order, Alternatives 9, 4, 5, 3, and 2. However, the distribution of individuals in the population is not equal across the project area. Therefore, this assumption may not be correct. That is why the same mitigation is applied to all action alternatives. By implementing this mitigation, none of the proposed heli-skiing activities should impact any wildlife population, although individual animals may be affected.

Effects on Individual Species

Potential impacts to each species were considered using the following ranked approach to address disturbance impacts on wildlife species (USDI-National Park Service 1994).

Negligible effects

- No species of concern are present, minor or no impacts expected.
- Minor impacts that do occur have no secondary (long-term population) effects.

Low Impacts

- Non-breeders of concern present in low numbers.
- Habitat is not critical for survival; not limited to the area targeted for overflights, etc.
- No serious concerns expressed by State or Federal fish and wildlife officials.

Moderate Impacts

- Breeding animals of concern are present and/or present for critical life stages.

- Mortality/interference is not expected to threaten the continued existence of species in the area.
- State and Federal officials express some concern.

High Impacts

- Breeding animals present in high numbers and/or during critical life stages.
- Overflight areas have a history of use during critical life stages during critical periods. Habitat is limited and animals cannot relocate to avoid impacts.
- Mortality or other effects (injury, physiological stress, effects on reproduction and young raising) are expected on a regular basis; these effects threaten the continued survival of the species.
- State or Federal officials express serious concern.

Threatened, Endangered and Sensitive Species

There would be no direct, indirect, or cumulative impacts to threatened, endangered or sensitive species because they do not occur within the permit area during the operating season (see Biological Evaluation, Appendix C).

Management Indicator Species

Management Indicator Species that could experience *low to moderate* impacts from heli-skiing are the brown bear and mountain goat. There would be *low to negligible* effects on the moose.

Brown Bear--

Brown bears are normally not active during the heli-skiing season but winter in dens through mid-April. Brown bears may be susceptible to disturbance while in their dens or at the time of emergence. Denning bears react to disturbance depending on several factors, such as bear temperament, the type of disturbance, the insulation of the den, and the time of year. Bear dens would most likely be in deep snow that would provide good auditory insulation. During emergence, brown bears are prone to starvation and require undisturbed habitat in order to acquire adequate forage. Den abandonment increases the mortality rates of brown bears (Olliff et al. 1999). The proposed mitigation measure (see Chapter 2) would reduce the potential for direct disturbance, but would not eliminate it, as brown bears den in different locations each year. Identifying emerging brown bears would reduce further disturbance by avoiding the area.

Indirect Effects

No indirect effects on brown bears are expected.

Cumulative Effects

There are three stages in the annual cycle where brown bears are vulnerable to the impact of winter recreation use: (1) pre-denning; (2) denning; and (3) post-denning emergence. Conflicts could occur when skiing and snowmachine use coincides with spring bear emergence and foraging (USDA-Forest Service 2002b). Heli-skiing operations in combination with other motorized and non-motorized dispersed winter recreation activities may result in cumulative disturbance that could impact individual brown bears. As winter recreation uses continue to expand, the overall cumulative effect is uncertain. The development of a model to predict den areas on the Kenai Peninsula will help reduce this conflict.

Comparison of Alternatives

Under Alternative 1, No Action, CPG's permit would not be issued and no helicopter skiing would occur on the Kenai Peninsula geographic area unless another permit were applied for and granted. As a consequence, there would be no impacts to brown bears. Under all action alternatives, heli-skiing operation may affect individual brown bears. However, helicopters must maintain a 1,500 feet AGL at all times except shuttling passengers from the bottom to the top of a run, during landing and takeoffs, and unless safety would be compromised. If a brown bear den is located (either by CPG or during wildlife observation flights), then CPG would maintain a ½ mile horizontal or 1,500 AGL separation during their operations. Helicopters may not hover, circle, or harass brown bears in any way. Therefore, it is unlikely that any action alternative would have a substantial effect on brown bears or impact brown bear populations or viability.

Mountain Goat--

Direct Effects

Heli-skiing has the potential to disturb mountain goats. Goats are active during the heli-skiing season, are widespread, and their winter habitat overlaps some parts of the proposed heli-skiing areas. Helicopter overflights can disturb and alter normal goat behavior, to varying degrees (Forest and Rahe 1983, Côté 1996, USDA-Forest Service 2003b). Physiological responses are unknown, but measures of overt behavior indicate short-term disturbance and no significant alteration of maintenance behavior. If helicopters consistently use similar flight paths, mountain goats may become habituated, reducing the effect of the disturbance.

Management recommendations for helicopter activities aimed at reducing impacts to mountain goats include excluding mountain goat winter concentration areas (no-fly zones), modifying flight patterns to avoid occupied goat range, minimizing the number of flights in areas used by goats, and regulating the flight altitudes above goat habitat (Wilson and Shackleton 2001). These measures would provide protection to mountain goats wintering in the permit areas. However, it is possible that there could be goats wintering outside of the designated no-fly zones. In these instances, some disturbance to individuals could occur. The level of disturbance would depend on the frequency of the skiing activity.

Indirect Effects

None expected.

Cumulative Effects

Aircraft assisted recreation, such as heli-skiing, backcountry skiing, and site seeing has increased annually in the amount and level of disturbance. This may have a cumulative impact on mountain goats. Other forms of winter recreation would have little cumulative impact because of the rugged terrain used by the goats. Occasionally, a snowmachine user may disturb them. The Chugach National Forest will continue to survey for and monitor mountain goats. This information will be used to update the mountain goat model. Monitoring goat numbers and locations over time will assist in identifying trends in their populations.

During winter, disturbance that causes energy expenditure can be detrimental to mountain goats. The exact metabolic cost depends on the intensity and duration of the disturbance. However, the cumulative stresses encountered over an entire winter can result in alteration of seasonal and daily movements, reduced foraging efficiency, decreased reproductive success, increased chance of accidents and falls, abandonment of preferred range, decreased resistance to disease, increased vulnerability to predation, and direct mortality (Geist 1978, Joslin 1986, Vogel et al. 1995). Kidding may also be a particularly sensitive time for goats, when the consequences of disturbance could be detrimental for a population. However, kidding in Alaska goat populations takes place in mid-May to mid-June, after the helicopter skiing season is concluded.

Comparison of Alternatives

Under Alternative 1, No Action, CPG's permit would not be issued and no helicopter skiing would occur on the Kenai Peninsula geographic area unless another permit were applied for and granted. As a consequence, there would be no impact from this activity to mountain goats. All action alternatives may affect individual mountain goats, but it is unlikely that any alternative would have a substantial effect on mountain goat populations or viability. Winter goat locations were documented through annual aerial surveys. These locations were used to develop a goat habitat model. From this work wildlife biologist from the Chugach National Forest and ADFG identified 57 no-fly zones (see Appendix C). Helicopters are not allowed to access the no-fly zones unless they maintain a 1,500 feet AGL at all times and they must maintain a 1,500 feet separation level from all observed goats. Helicopters may not hover, circle, or harass mountain goats in any way.

Moose--

Direct Effects

Moose do not inhabit the areas used for heli-skiing, but do occur on winter ranges in the valley bottom. Moose winter range is found within the Mile 12.4 staging area and within the lower reaches of the Bench Peak area. Helicopters may fly over moose winter range to access the East Twentymile, Placer-Skookum, Snow River, and Mt. Ascension units, but they must maintain a minimum of 1,500 feet AGL.

Indirect Effects

No indirect effects are expected.

Cumulative Effects

Motorized and non-motorized winter recreation activities in moose winter range could cause individual animals to expend energy to move away from the disturbance. Moose disturbed by snowmachines and skiers could further be disturbed by helicopter overflights. Such a disturbance would be relatively minor and short term.

Comparison of Alternatives

Under Alternative 1, No Action, CPG's permit would not be issued and no helicopter skiing would occur on the Kenai Peninsula geographic area unless another permit were applied for and granted. As a consequence, there would be no impacts to the moose. Under all action alternatives, heli-skiing operation may affect individual moose. However, helicopters must maintain a 1,500 feet AGL at all times except shuttling

passengers from the bottom to the top of a run, during landing and takeoffs, and if safety would be compromised. Helicopters may not hover, circle, or harass moose in any way. Therefore, it is unlikely that any action alternative would have a substantial effect on the moose. Alternatives 4 and 9 would have less impact on the moose, as heli-skiing would not be permitted in the Mt. Ascension and Snow River units, thereby eliminating overflights of moose winter range in these areas.

Species of Special Interest

The Species of Special Interest that could experience *low to moderate* impacts from heli-skiing is the wolverine. The bald eagle, Canada lynx, and gray wolf could experience *low to negligible* impacts. There would be *negligible* effects on the river otter, northern goshawk, marbled murrelet, and Townsend's Warbler. They will not be discussed further in this document.

Wolverine--

Direct Effects

Given the lack of studies on wolverine, it is not surprising that none of the published information deals directly with the issue of helicopter disturbance on this species. However, there is evidence that the species may tolerate human intrusion poorly, particularly when the disturbance is near reproductive denning sites.

Denning females could be displaced by helicopter skiing activities occurring in denning areas and could abandon their den sites. Myrberget (1968) mentions four instances of den abandonment due to human disturbance and suggests that secondary dens may be less suitable. Direct contact occurred with two denning females in Idaho in late April and May and resulted in den abandonment in both cases (Copeland 1996). Abandonment of den sites would adversely impact both the female wolverine and her kits. The natal denning period is a critical time for females because they must maintain energy levels to properly nourish their kits during a time when food is scarce. Disturbance during this time, when the females are lactating, could lead to increased energy expenditure and reduced fitness. Kits are at risk to various sources of mortality if they have to abandon their den site. Kits are more vulnerable to predation while being moved to a new den site, or when kept at insecure sites (Magoun and Copeland 1998). They could also experience loss of fitness due to nutritional stress induced by the mother's search for and move to a new den site. Magoun and Copeland (1998) reported instances where although females did not abandon natal dens after disturbances from humans, associated maternal dens, which are speculated to be less "secure" than natal dens, were abandoned within hours of being disturbed by humans.

Wolverines may be distributed across all of the units proposed for heli-skiing (Golden et al. 1993). Wolverine tracks were located in Seattle Creek, Bench Peak, Moose Creek, Ptarmigan, Snow River and Mt. Ascension. Placer-Skookum, Grandview, and units north of the Turnagain Arm were not surveyed. Heli-skiing in remote areas has the potential to displace wolverines, or disrupt foraging or travel patterns. Wolverines may abandon dens after human disturbance (Heinemeyer et al 2001). Den abandonment can lead to reduced reproduction or lower kit survival (Magoun and Copeland 1998).

Indirect Effects

No indirect effects are expected.

Cumulative Effects

Heli-skiing in combination with other motorized and non-motorized winter recreation activities in remote areas would result in a cumulative disturbance to wolverine. Although the denning period appears to be the most critical time for wolverine breeding success, it is possible that individuals of either gender could be displaced due to the presence of any type of backcountry recreationists including heli-skiers. Unless an area was to receive repeated and high frequency use, it is unlikely that such a displacement would be permanent or result in long-distance movements. Wolverines maintain extensive territories and disturbance in one area of their territory would likely lead only to an individual refocusing its activities elsewhere within its territory. Wolverine surveys beginning in the winter of 2003-2004 will aid in identifying distribution, density, and denning habitat.

Comparison of Alternatives

Under Alternative 1, No Action, CPG's permit would not be issued and no helicopter skiing would occur on the Kenai Peninsula geographic area, unless another permit were applied for and granted. As a consequence, there would be no impacts to wolverine. Under all action alternatives, heli-skiing operation may affect individual wolverine. However, helicopters must maintain a 1,500 feet AGL at all times except shuttling passengers from the bottom to the top of a run, during landing and takeoffs, and if safety would be compromised. If a wolverine den is located (either by CPG or during wildlife observation flights), then CPG would maintain a 1/2 mile horizontal or 1,500 AGL separation during their operations. Helicopters may not hover, circle, or harass wolverine in any way. Therefore, it is unlikely that any action alternative would have a substantial effect on wolverine or impact wolverine populations or viability.

Bald Eagle--

Direct Effects

Helicopter flights have the potential to disturb nesting and foraging eagles. Reactions to helicopters are reportedly mixed and may be related to the amount of helicopter hovering time spent above a nest, height above the nest, or the frequency of flights in a nest's vicinity (Hancock 1966, White and Sherrod 1973, Call 1979). Bald eagles typically utilize lower elevations along open water in winter, habitat conditions that do not occur at the altitudes and locations where heli-skiing activities take place. Some over-flights of individuals utilizing habitat near helicopter staging areas could occur. To minimize any possible effect on the bald eagle, two mitigation measures have been formulated. (1) No skiing or other human activity is allowed within 330 feet of known bald eagle nests. The Glacier Ranger District will provide CPG an updated bald eagle nest map prior to each season. (2) Helicopters will not fly within 1/4-mile horizontal distance or 1,500 AGL of any active bald eagle nest. When it is not known whether the nest is active, helicopter flights will avoid the nest. For these reasons, it is predicted that issuance of the heli-ski permit would have no effect on bald eagles within or in the vicinity of the permit area.

Indirect Effects

No indirect effects are expected.

Cumulative Effects

The cumulative effects of recreation activities can have deleterious effects on bald eagle populations through a reduction in survival, especially in the winter and in reduced reproductive success rates (Anthony, et al. 1995, Montolopi and Anderson 1991). Snowmachines may be especially disturbing, probably due to random movement, loud noise, and operators who are generally out in the open (Walter and Garrett 1981). Grubb and King (1991) found that pedestrians were the most disruptive of the human activities to bald eagles. The proposed mitigation measures are expected to prevent any adverse effects on bald eagle populations and their habitat and will not result in loss of species viability.

Comparison of Alternatives

Under Alternative 1, No Action, CPG's permit would not be issued and there would be no impacts to the bald eagle. Under all action alternatives, heli-skiing operations are not expected to have a substantial effect on individual bald eagles. Alternatives 4 and 9 would have less impacts to bald eagle, as heli-skiing would not be permitted in the Seattle Creek unit where eagles concentrate nesting and foraging along Turnagain Arm. Alternatives 3 and 5 reduce the heli-skiing use in parts of Seattle Creek.

Canada Lynx--

Direct Effects

Because the lynx is crepuscular (active at dawn and dusk), and are probably active on moonlit nights, some natural temporal separation would occur between the lynx's period of activity and helicopter skiing activities. Also, skiing takes place primarily on open slopes, with a smaller percentage of skiing activity conducted in sparsely timbered areas. The density of trees that allows skiing is generally lower than the highest quality lynx or snowshoe hare habitat. Some forms of human activity in the vicinity of lynx appear to be compatible with the species' persistence (Mowat et al. 2000).

Indirect Effects

No indirect effects are expected. Helicopter skiing activities are not likely to facilitate the movement of the lynx's competitors into lynx habitat. Unlike snowmachine activities or backcountry skiing, helicopter skiing produces segmented trails that are confined to a relatively limited area. Furthermore, heli-skiers tend to make a single run in a track, which in most snow conditions does not produce a well-packed travel surface for wildlife. In contrast, snowmachines and skiers create more extensive trail networks and trails packed from repeated use, typically originating from lower elevations where lynx competitors occur, and these trails could facilitate the movement of competitors into lynx habitat.

Cumulative Effects

The cumulative effects of winter backcountry recreation activities could impact lynx populations. However, lynx are generally crepuscular, and their highest activity time would be outside of most winter recreation activities. Also, lynx are known to tolerate a moderate amount of human activity. If disturbed by a helicopter, snow machine, or skier, they would be expected to seek cover and then return to normal activity.

Comparison of Alternatives

Under Alternative 1, No Action, CPG's permit would not be issued and there would be no impacts to the lynx. Under all action alternatives, heli-skiing operation may affect individual lynx, but it is unlikely to have a substantial effect on their populations or viability.

Gray Wolf--

Direct Effects

Impacts of helicopter skiing activities on wolves have not been studied. Some wolves could abandon a den site after disturbance, and other more tolerant individuals may not abandon dens unless disturbance is frequent or severe (Thiel et al. 1998). It is possible that wolves could modify their behavior as a result of overflights.

Indirect Effects

Wolves may also be impacted if prey species, such as mountain goats, Dall's sheep, or moose, alter their behavior in response to heli-skiing (Olliff et al. 1999). Depending on the behavioral modifications of the prey, this could result in either a positive or negative result for wolves (e.g., disturbance of prey could make it more vulnerable to predation, or it could force prey out of the pack's range).

Cumulative Effects

The cumulative effects of winter recreation activities could impact wolf populations. If disturbed by a helicopter, snowmachine, or skier they would be expected to move away from the disturbance and seek cover, and then return to normal activity.

Comparison of Alternatives

Under Alternative 1, No Action, CPG's permit would not be issued and no helicopter skiing would occur on the Kenai Peninsula geographic area unless another permit were applied for and granted. As a consequence, there would be no impacts to gray wolves. Under all action alternatives, heli-skiing operation may affect individual wolves. However, helicopters must maintain a 1,500 feet AGL at all times except shuttling passengers from the bottom to the top of a run, during landing and takeoffs, and if safety would be compromised. Helicopters may not hover, circle, or harass wolves in any way. Therefore, it is unlikely that any action alternative would have a substantial effect on wolves or impact wolf populations or viability.

Other Species of Concern

Other species of concern that could experience *low to moderate* impacts from heli-skiing is the Dall's sheep. There would be *negligible* effects on migratory birds and they will not be discussed further in this document.

Dall's Sheep--

Direct Effects

Heli-skiing has the potential to disturb Dall's sheep. Sheep are active during the heli-skiing season and are found in large concentrations during the winter in discrete locations. Sheep locations overlap the proposed heli-skiing in the Moose Creek, Ptarmigan, and a small part of the West Bench Peak units. Behavior responses are

similar to those observed in mountain goats. These include interruption of rest and rumination, increased alertness, and fleeing to escape terrain (Krausman and Hervert 1983, Stockwell et al. 1991, Frid 2003). Nette and others (1984) documented injuries due to panicked escape behavior and increased vulnerability.

Indirect Effects

Prolonged elevated heart rates have been measured when overflight were less than 400 meters away (approximately 1/4 mile) (MacArthur et al. 1982, Stemp 1983). Indirect effect could include reduced reproduction, if physiological disturbance is substantial. Other indirect effect could result if predators, such as bears, wolves, or wolverines, reduce their use of an area because of the helicopter disturbance resulting in a benefit to the sheep. With the proposed mitigation, it would be unlikely that there would be a change in behavior or physiological responses by sheep.

Cumulative Effects

Dall's sheep may be affected over time by aircraft assisted recreation, such as heli-skiing, backcountry skiing and site seeing. Monitoring of sheep numbers and locations should assist in identifying changing population numbers.

Comparison of Alternatives

Under Alternative 1, No Action, CPG's permit would not be issued and there would be no impacts to the Dall's sheep. No-fly zones created for mountain goats overlap with concentrations of Dall's sheep according to observations made by the ADFG (L. Nichols personal communication) and summer survey data (USDA-Forest Service, unpublished). Helicopters are not allowed to access the no-fly zones unless they maintain a 1,500 feet AGL at all times and they must maintain a 1,500 feet separation level from all observed sheep. Helicopters may not hover, circle, or harass sheep in any way. Under all action alternatives, heli-skiing operation may affect individual sheep, but it is unlikely to have a substantial effect on their populations or viability.

Recreation Conflicts (Issue 2)

Issue Statement

While many forms of winter recreational use have increased in recent years (e.g., ski touring, skate skiing, backcountry skiing, snowmachine use), non-motorized recreationists express the most concern regarding this proposal. Some backcountry skiers said that the presence of the helicopter, primarily as a source of noise in an otherwise pristine area, detracts from their recreational experience. The conflict is also over competition for snow. Some feel that the sudden presence of heli-skiers in areas that backcountry skiers have expended considerable effort to reach is unfair, especially when it involves terrain accessible for day tours. Concerns for the safety of backcountry skiers and snowmachine users down slope from heli-ski groups were also expressed.

To contrast the proposed action and alternatives on the basis of this issue, our analysis focuses on the availability of helicopter skiing opportunities and conflicts with other winter recreationists. The four main elements of user conflicts are: (1) noise disturbance, (2) a sense of fairness in effort expended to reach backcountry locations, (3) safety concerns about avalanches, and (4) litter left behind by the heli-ski company and heli-ski clients. All effects are direct or cumulative; there are no indirect effects. Much of this information is taken from the *Recreation Resource Report* prepared for this project by Teresa Paquet, Glacier Ranger District and Karen Kromrey, Seward Ranger District (USDA-Forest Service 2003c).

Members of the public commented that they would experience (or have experienced) some or all elements of the above described user conflict in the following areas proposed by Chugach Powder Guides:

- Glacier/Winner (potential noise impacts by flight path)
- West Seattle Creek (potential noise impacts), East Seattle Creek
- Placer/Skookum (potential flight path from staging area)
- West Bench Peak, North Bench Peak
- Mt. Ascension

Each year the snow conditions and weather determine the number of recreation users that use particular areas. Therefore, each year the level of conflict that could occur may vary greatly. The greatest level of conflict would potentially occur on days when the weather is clear and there is adequate snow and cooler temperatures that create ideal conditions for both heli-skiers and backcountry skiers and both user groups are in the area at the same time. The districts developed a scale for rating the potential recreation user conflict each proposed heli-skiing unit might have. The factors that were used to develop the ratings are:

1. Number of non-motorized users in an area in which to experience a conflict with heli-skiing activities.
2. Timing restrictions for heli-skiing activities.
3. Proximity of helicopter staging areas and flight paths to and from the staging area to areas where non-motorized users recreate.
4. Level of heli-skiing use in permitted units in the past.
5. Units where heli-skiing activities would not be permitted.

Table 4-1 shows the rating for potential user conflict for each proposed heli-skiing unit.

Appendix E contains a guide that demonstrates how the above factors were used to develop the rating for each area and a detailed discussion of how the rating was developed for each unit. The discussion below is a summary of the ratings for the units and specific discussion of those which received a rating of moderate potential user conflict or higher.

Effect of Alternatives

Table 4-1 displays a summary of the recreation user conflict by heli-skiing unit. Following the table, units that have a rating of Moderate or High are discussed in detail by alternative. Units received a low rating because backcountry non-motorized recreationists do not use the unit extensively and the probability of a conflict of occurring would be low, and/or the unit will not be used and/or impacted by permitted heli-skiing activities. The units with a low or none rating are not discussed in detail in the EIS but are presented in detail in appendix H

Table 4-1 Summary of Recreation Conflicts

Unit	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 9
Glacier-Winner	None	Low	Low	Low	Low	Low
West Twentymile	None	Low	Low	Low	Low	Low
North Twentymile	None	Low	Low	Low	Low	Low
East Twentymile	None	Low	Low	Low	Low	None
Grandview	None	Low	Low	Low	Low	Low
Placer-Skookum	None	Moderate	Moderate	Moderate	Moderate	Moderate
East Bench Peak	None	Low	Low	Low	Low	Low
North Bench Peak	None	Low	Low	Low	Low	Low
West Bench Peak	None	High	Moderate	Moderate	Low	Low
West Seattle Creek	None	Low	Low	None	None	None
Mid Seattle Creek	None	Low	Low	None	Low	None
East Seattle Creek	None	Moderate	Moderate	None	Low	None
West Moose Ck.	None	Low	Low	None	Low	None
East Moose Ck.	None	Low	Low	None	Low	None
West Ptarmigan	None	Low	Low	None	Low	None
East Ptarmigan	None	Low	Low	None	Low	None
Snow River	None	Low	Low	None	Low	None
Mt. Ascension	None	Low	Low	None	Low	None

Alternative 1 (No Action - No permit issued)

Under this alternative, a special use permit would not be issued to Chugach Powder Guides for heli-skiing activities. Heli-skiing activities by non-guided individuals might still occur in areas open for winter motorized recreation. There are no restrictions on these non-guided activities and it is not known how many trips occur each year but it is estimated to be very low.

The following effects on recreationists and recreation activities can be anticipated under Alternative 1:

Heli-skiing opportunities

This alternative would eliminate any opportunities for heli-skiing opportunities on the Kenai Peninsula geographic portion of the Chugach National Forest (including the area around the community of Girdwood). These opportunities would still be available on other portions of the Chugach National Forest near Valdez.

User Conflicts

This alternative would eliminate existing levels of users conflicts between backcountry skiers/snowboarders/snowshoers and commercially guided heli-skiers in the Bench Peak area and would eliminate any potential for conflicts in additional areas.

Alternative 2 (Chugach Powder Guides Proposal as modified)

Under this alternative, a special use permit would be issued to Chugach Powder Guides for heli-skiing activities in core and exploratory areas, totaling 338,200 acres. The company would be permitted for 1800 client days for the core areas and 600 client days for exploratory areas. Some of the areas permitted would overlap areas used by non-motorized recreationists who expressed concern with CPG's proposal during project scoping. This alternative does restrict heli-skiing activities in West Bench Peak, a popular location for non-motorized recreationists, to Monday through Thursday.

The following effects on recreationists and recreation activities can be anticipated under Alternative 2:

Heli-skiing opportunities

This alternative would make maximum opportunities available to members of the public who wish to participate in heli-skiing activities in regards to varying terrain, elevation, and snow conditions and area. The units that would be permitted cover 338,200 acres of National Forest between the Seward Ranger District and the Glacier Ranger District. A timing restriction on one of the units would reduce the number of acres available for heli-skiing on Friday through Sunday to 320,100. New areas would be available for those clients who are returning. The proponent has stated that many of the clients are return customers.

User Conflicts

This alternative would have the highest potential for user conflicts because of the total number of client days that would be permitted and because of the large amount of area under permit. The following ratings for potential conflict are based on the criteria listed in Appendix E.

- West Bench Peak unit has a high potential for user conflict. This unit has higher non-motorized recreation use, is located in close proximity to the staging area at Mile 62, and is a key connecting unit for CPG to access other units further south. CPG has used this unit in 2003 for 5 days and on the highest use day, CPG utilized ski runs in the unit 43 times during the day (see appendix G for information on 2001 and 2002). The average number of times ski runs were utilized was 15 times during a day. Even though CPG didn't utilize the area very frequently, on the days when heli-skiing occurred, there would have been high probability of conflict occurring with non-motorized skiers.

- Mid Seattle Creek, East Seattle Creek, and Placer-Skookum units have a moderate potential for user conflict (After March 31st, Placer-Skookum unit has a low potential because it is not available for heli-skiing activities from April 1 through May 1). Mid Seattle Creek and East Seattle Creek have a moderate amount of non-motorized users and access to these units is not located directly along a flight path from a staging area. Placer Skookum also has a moderate amount of non-motorized use but also has a high number of motorized users in the same area and the flight path from Big Game Alaska staging area would travel in the same proximity as this recreation route. Placer-Skookum unit is also a consistently high use area for CPG. In 2003, this unit was used 8 days, and ski runs were used 36 times during one day on the highest use day. The average number of times ski runs were used during one day was 19.
- All remaining units have low or no potential for user conflicts due to low numbers of non-motorized recreation users using the areas, and no staging areas or flight paths within close proximity to areas where non-motorized users are recreating. Although some non-motorized recreationists commented that they would experience user conflict with heli-skiing in the Mt. Ascension unit, a lower number of non-motorized recreationists use the area in part due to the large number of snow machines using the area. A rating of low for potential conflict was given because of the low number of non-motorized users who use the area and the area is an exploratory unit, which potentially would receive infrequent heli-skiing use if permitted.
- The potential staging area at Mile 33.2 is located less than a 1/8 of a mile from Carter Lake Trailhead. Recreationists who utilize the Carter Lake Trailhead at the same time as a helicopter using the staging area would be highly impacted by the noise and exhaust of the helicopter for a short time.

Alternative 3 (Reduce Recreation Conflicts and Impact on Communities)

Under this alternative, a special use permit would be issued to Chugach Powder Guides for heli-skiing activities in core and exploratory units, totaling 306,300 acres. The company would be permitted for 1800 client days for the core units and 400 client days for exploratory units. Some of the units permitted would overlap areas used by non-motorized recreationists who expressed concern with CPG's proposal during project scoping. This alternative does restrict heli-skiing activities in West Bench Peak, North Bench Peak, and East Seattle Creek units to Monday through Thursday.

The following effects on recreationists and recreation activities can be anticipated under Alternative 3:

Heli-skiing opportunities

This alternative would have the same number of client days available for skiing as the Alternative 2 but some units would be eliminated or have a timing restriction. The area that would be permitted for Monday through Thursday covers 306,300 acres of National Forest and the acreage available for heli-skiing on Friday through Sunday would be 270,700 acres. New areas would be available for those clients who are returning.

User Conflicts

This alternative would have some potential for user conflicts because of the total number of client days that would be permitted and because some of the areas available for heli-skiing activities are in areas where non-motorized users recreate.

- West Bench Peak and Placer-Skookum units have a moderate potential for user conflict. West Bench Peak has a timing restriction for heli-skiing activities occurring on weekdays only, but it is still located within close proximity to the staging area at Mile 62, and is a key connecting unit for CPG to access other units further south. Placer Skookum has a moderate amount of non-motorized use and high numbers of motorized users in the same area. The flight path from the Big Game Alaska staging area would travel in the same proximity as this recreation route (After March 31st, Placer-Skookum unit has a low potential because the unit is not available for heli-skiing activities from April 1 through May 1). Both units have received past use from CPG in varying number of days and intensity.
- All remaining units have low or no potential for user conflicts due to low numbers of non-motorized recreation users using the areas, and no staging areas or flight paths within close proximity to areas where non-motorized users are recreating.

Alternative 4 (Current Level – 2003)

Under this alternative, a special use permit would be issued to Chugach Powder Guides for heli-skiing activities in core units only over 159,100 acres. The company would be permitted for 1200 client days. Some of the areas permitted would overlap areas used by non-motorized recreationists who expressed concern with CPG's proposal during project scoping. This alternative does restrict heli-skiing activities in West Bench Peak to Monday through Thursday only.

The following effects on recreationists and recreation activities can be anticipated under Alternative 3:

Heli-skiing opportunities

This alternative would have the same number of client days available for skiing as the permit issued for the 2003 season. The area that would be permitted for Monday through Thursday covers 159,100 acres of National Forest and the acreage available for heli-skiing on Friday through Sunday would be 141,000 acres. There would be no new areas available for those clients who are returning.

User Conflicts

This alternative would have a lower impact on recreation users because of the lower number of client days and less area that would be permitted. There is still some potential for user conflict as listed below:

- West Bench Peak and Placer-Skookum units have a moderate potential for user conflict. West Bench Peak has a timing restriction for heli-skiing activities occurring on weekdays only but it is still located within close proximity to the staging area at Mile 62, and is a key connecting unit for CPG to access other units further south. Placer

Skookum has a moderate amount of non-motorized use and high numbers of motorized users in the same area. The flight path from the Big Game Alaska staging area would travel in the same proximity as this recreation route (After March 31st, Placer-Skookum unit has a low potential because 5,800 acres of the unit are not available for heli-skiing activities from April 1 through May 1). Both units have been used by CPG in varying number of days and intensity.

- All remaining units have low or no potential for user conflicts due to low numbers of non-motorized recreation users using the areas, and no staging areas or flight paths within close proximity to areas where non-motorized users are recreating.

Alternative 5 (Minimize Recreation Conflicts)

Under this alternative, a special use permit would be issued to Chugach Powder Guides for heli-skiing activities in core and exploratory areas, totaling 231,400 acres. The company would be permitted for 1500 client days for the core areas and 300 client days for exploratory areas. This alternative drops those units where scoping comments indicated non-motorized backcountry skiing would be greatly impacted by heli-skiing activities. The units dropped were East Seattle Creek, West Seattle Creek, West Bench Peak, North Bench Peak, and Mt. Ascension. There are no timing restrictions on the permitted units.

The following effects on recreationists and recreation activities can be anticipated under Alternative 3:

Heli-skiing opportunities

This alternative would have a lower number of client days available for skiing than Alternative 2 and some units would be eliminated. The area that would be permitted for heli-skiing activities covers 231,400 acres of National Forest. New areas would be available for those clients who are returning.

User Conflicts

This alternative as a whole would have low potential to impact other users because of the units that were dropped where non-motorized activities occur but it would still have some potential for conflict with flight routes from staging areas.

- Placer-Skookum unit has a moderate potential for user conflict. The unit has a moderate amount of non-motorized use and high numbers of motorized users in the same area. The flight path from the Big Game Alaska staging area would travel in the same proximity as this recreation route (After March 31st, Placer-Skookum unit has a low potential because 5,800 acres of the unit are not available for heli-skiing activities from April 1 through May 1). This unit is also a consistently higher use area for CPG.
- All remaining units have low or no potential for user conflicts due to low numbers of non-motorized recreation users using the areas, and/or no staging areas or flight paths within close proximity to areas where non-motorized users are recreating.

Alternative 9 (2000-2002 Level of Use)

Under this alternative, a special use permit would be issued to Chugach Powder Guides for heli-skiing activities in core areas only over 104,700 acres. The company would be permitted for 800 client days. This alternative has no restrictions on use during the weekdays for any unit.

The following effects on recreationists and recreation activities can be anticipated under Alternative 3:

Heli-skiing opportunities

This alternative would have the same number of client days available for skiing as the permit issued for the 2002 season. The area that would be permitted for heli-skiing activities covers 104,700 acres of National Forest. There would be no new areas available for those clients who are returning

User Conflicts

This alternative would have similar impacts on non-recreation users as alternative 4 but with 400 less client days permitted. There is still some potential for user conflict as listed below:

- Placer-Skookum unit has a moderate potential for user conflict. The unit has a moderate amount of non-motorized use and high numbers of motorized users in the same area. The flight path from the Big Game Alaska staging area would travel in the same proximity as this recreation route (After March 31st, Placer-Skookum unit has a low potential because 5,800 acres of the unit are not available for heli-skiing activities from April 1 through May 1). This unit is also a consistently higher use area for CPG.
- All remaining units have low or no potential for user conflicts due to low numbers of non-motorized recreation users using the areas, and no staging areas or flight paths within close proximity to areas where non-motorized users are recreating.

Cumulative Impacts

From On-Going Activities

The Background Information discussion at the start of Chapter 3 indicates that growth is occurring in most forms of winter outdoor recreation, particularly backcountry skiing, and snowmachine use. More people are backcountry skiing and using backcountry areas. Some perceive Heli-skiing as a nuisance that ruins the experience they are seeking. Growth in snowmachine use, combined with the noise of other aircraft, may in some instances add incrementally to the disturbance associated with heli-skiing. Overall, the net impact is that there are more recreationists seeking the solitude of undisturbed nature and more forces at work to reduce the possibility of finding it. To compensate for some of these impacts, over 200,000 acres has been designated for non-motorized winter recreation activities within the Kenai Peninsula Geographic Area, (USDA Forest Service 2002b).

Some backcountry skiers are reporting a sense of crowding and changing recreation

experiences in non-motorized areas that had been favorite skiing, snowboarding, and snowshoeing areas. These areas are Turnagain Pass East Side and Manitoba Mountain near Lower Summit Lake. Non-motorized users are starting to expand into other winter motorized allowed areas to seek less crowded areas. These areas include more areas of the Bench Peak area (West and North areas), Seattle Creek, and Mt. Ascension. Non-motorized users already have a sense of being pushed out of some of these motorized areas by the growing numbers of snowmachine enthusiasts (Mt. Ascension area is an example of this). Permitting heli-skiing in these same areas that have not been permitted in the past (West Seattle Creek and Mt. Ascension) may further exasperate the situation with the non-motorized recreation users. It may persuade the growing numbers of non-motorized users to stay in the non-motorized use areas, which could lead to a greater sense of crowding felt by all non-motorized users.

Alternative 2, the Proposed Action and Alternative 3 would have the greatest cumulative impacts for non-motorized users. Alternatives 4, and 9 would provide more opportunities for non-motorized users and would have less cumulative impacts. There would be no cumulative impact under Alternative 1, No Action, because the heli-skiing permit would not be issued.

From Proposed Activities

Iditarod National Historic Trail Comprehensive Management Plan: There would no cumulative impacts from implementing the *Iditarod National Historic Trail Comprehensive Management Plan*.

Nordic Ski Train: The Anchorage Nordic Ski Club has received a permit from the Forest Service in past years to use a Nordic Ski Train to Grandview where people would be dropped off for a day of skiing along Trail Creek and up to several of the glaciers near the railroad. This will bring a large number of skiers into this area on weekends in March

Outfitter/Guide Use: Outfitter/guide companies for snowmobile use add cumulatively to non-motorized recreation conflict and noise level in the Turnagain Pass area, Placer and Twenty Mile drainages, and the Johnson Pass Trail area. Guided skiing and camping in Placer River Valley, Johnson Pass from the south side, Russian Lakes Trail, and Ptarmigan Creek Trail would have no cumulative impact.

Paradise Valley Hut-to-Hut Proposal: If the Paradise Valley Hut-to-Hut proposal is accepted, approved, and authorized, encourage CPG and the Huts Association permit holders to work together to minimize the user conflicts that may arise in the spring season. There should be little cumulative effects from this project. The level of user conflicts could rise in the future if the proposal is expanded into the Twentymile drainage.

Cooper Lake Yurt Proposal: If the Cooper Lake Yurt proposal is accepted, approved, and authorized, CPG and the Alaska Mountain Yurt permit holders would be encouraged to work together to minimize the user conflicts that may arise in the skiing season. . There should be little cumulative effects from this project.

Recreation Facility Development within the project area: Additional cabins could

increase the amount of use of the areas by backcountry skiers between Moose Pass and Portage Valley. The ski trail system in the Grayling/Meridian Lake Area would increase skiers in this area. As new facilities are implemented user conflicts may well rise to higher levels than are currently present

Impacts on Communities (Issue 3)

Issue Statement

Lifestyles of rural communities can be negatively impacted by increases in permitted helicopter use either incrementally over a number of years or by a sudden increase. The noise and visual disturbance of concentrated helicopter operations can affect the quality of life for residents in the following areas: Cooper Landing, Girdwood, Hope, Moose Pass, Seward, and Sunrise,

The following analysis focuses on the impacts of helicopter noise and helicopter sightings on the identified communities. While the overall helicopter operation is the main topic, staging areas are discussed in instances where they impact residential areas.

General Effects

Visibility and Noise

There are two sources of noise associated with helicopter operations: the engines and the rotor blades. Turbine powered helicopter engines, like the A-Star used by CPG, makes a sound no louder than a car or truck (USDA-Forest Service 1999b). The main rotor blades are responsible for much of the signature sound of a helicopter (HAI, 1993, El-Ghobasy, 1995). The “blade slap” is the most disturbing component of the noise due to its impulsive nature and because it occurs in the mid-frequency range where human hearing is most sensitive. As a helicopter approach, pass over people along flight paths, and continue on, it is estimated that the noise would be audible for up to 4 minutes, depending how close one was to the helicopter. The closer people are to the helicopter the longer the sound can be heard. Helicopters produce the most sound during an approach for a landing. The noise from helicopter sitting at staging area or landing/takeoff area could last several minutes.

Lifestyles of rural communities can be negatively impacted by increases in permitted helicopter use either incrementally over a number of years or by a sudden increase. The noise and visual disturbance of concentrated helicopter operations can affect the quality of life for residents in the following areas: Cooper Landing area, Girdwood, Hope, Moose Pass area, Seward, and Sunrise. In addition, individual residences, isolated businesses, and even small subdivisions along the Seward Highway, from Girdwood to Seward, could be impacted by the sound and sight of helicopters.

The visibility of the helicopter and the potential noise from helicopter activity in heli-ski units, staging areas and travel corridors were determined using the Grid Module of ArcINFO© GIS software. For purposes of this analysis it was assumed that visibility is a surrogate measure for noise, and that if a helicopter cannot be seen because of distance

or mountains between an observer and the helicopter that it is also less likely to be heard or not heard at all.

While visibility determination should be a certainty, provided available digital elevation maps are precise, noise determination is only a probability. Further, topography has an affect on normal dissipation of noise over distance. The noise of helicopters operating within a valley may be contained and may dissipate less, while outside the valley the helicopter noise may be less noticeable than at equal distances over flat terrain. Finally, noise transmission is also a function of atmospheric conditions and vegetative cover.

Nearly 400,000 acres, including 18 heli-ski units, 7 staging areas, and 6 travel corridors identified in the alternatives, were analyzed (see Map 4-1). In addition to the footprint of the areas on the ground, the GIS analysis added 500 feet to ground level elevations in order to insure that flight activity was also accounted for. Five hundred feet was used as it represents an average altitude of a helicopter during take-offs and landing and transporting heli-skiers between runs. Thus, the GIS analysis looked at three-dimensional “boxes” of helicopter activity rather than two-dimensional areas. A total of 12 observer points in the six communities (with 6 points in Moose Pass—from Mile 35 to Primrose and 2 in Cooper Landing) were incorporated in the analyses.

Map 4-1 front

Map 4-1 back

The analysis divided the areas and travel corridors into four classes of visibility: foreground (or within ½ mile distance), mid-ground (1/2 to 5 miles in distance), background (greater than 5 miles in distance), and not seen. These standard scenic integrity objective measures correspond to those used in the visual analysis for the Revised Forest Plan.

In addition to these simple acreage distributions, the populations of the communities were used to weight the visibility results in order to better understand the potential impact of activities on local residents. No attempt was made to determine the percent or actual decibel change in noise reduction in potential helicopter noise by distance or class of visibility.

Individual residences, isolated businesses, and small subdivisions along the Seward Highway, because of their scattered nature, were not analyzed.

Effect of Alternatives

Table 4-2 displays the acres of helicopter skiing units and travel corridors visible from each of the communities. In foreground areas (F), the helicopter would be readily visible and easily heard. In the mid-ground areas (M), the helicopter would generally be seen and could be heard. In the background areas (B), the helicopter would seldom be seen or heard.

Table 4-2 Helicopter Effects Areas by Community (acres)

Community	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 9
Copper Landing	0	5,456-B	5,456-B	0	0	0
Girdwood	0	128-F 1,805-M 13,991-B	128-F 1,805-M 11,645-B	128-F 1,686-M 6,513-B	128-F 1,805-M 9,126-B	128-F 1,686-M 6,360-B
Hope	0	0	0	0	0	0
Moose Pass	0	153-F 2,811-M 7,396-B	0 855-M 4,887-B	0 0 1,415-B	0 609-M 3,832-B	0 0 840-B
Seward	0	71-B	71-B	0	0	0
Sunrise	0	668-M 64-B	0 0	0 0	0 0	0 0

F=Foreground (within ½ mile distance)

M=Mid-ground (1/2 to 5 miles in distance)

B=Background (greater than 5 miles in distance)

Alternative 1 - No Action

Under the No Action Alternative, there would be no helicopter noise or helicopter sighting from commercial guided helicopter skiing.

Alternative 2 – Proposed Action

Because up to three helicopters could be operating at one time, there could be some overlap in the noise produced by the helicopters.

Cooper Landing area

There would be little helicopter noise and a slight chance of local residents seeing a helicopter except when they were skiing in the Mt. Ascension unit. About 10 percent of this unit is visible (background) from Cooper Landing.

Girdwood

There would be a moderate amount of helicopter noise and a high chance of local residents seeing a helicopter when they were operating out of the Girdwood Airport staging area. About two percent of the North Twentymile Complex travel corridor (includes the Girdwood Airport staging area) is within the foreground, 26 percent is in the mid-ground, and 13 percent is in the background from Girdwood. About two percent of the Seattle Creek travel corridor is in the mid-ground and three percent is in background.

There would be little helicopter noise and a slight chance of local residents seeing a helicopter when they were operating in the East Seattle Creek unit (21 percent of the unit is within the background), the Mid Seattle Creek unit (37 percent of the unit is within the background) and the Glacier Winter unit (24 percent of the unit is within the background) as seen from Girdwood.

There would be little helicopter noise and a slight chance of local residents seeing a helicopter when they were skiing in the West Seattle Creek unit (13 percent of the unit is within the background) and Placer-Skookum unit (13 percent is within the background) as seen from Girdwood.

To lessen the impact to Girdwood residents, helicopters exiting from the Girdwood Airport will stay at low levels either in Glacier Creek Gorge or just west of the creek until near the Four Corners area. Flights toward Turnagain Arm and the southern units will follow the western fringe of the Girdwood Valley until over the Seward Highway, then will follow the highway or cross Turnagain Arm. Flights departures from the Girdwood Airport to the south over residential areas will only be used as absolutely needed due to wind direction or other safety factors.

Moose Pass area

There would be a moderate amount of helicopter noise and a good chance of local residents seeing a helicopter by local residents when they were operating out of the Mile 33.2 Gravel Pit (near Moose Pass) staging area. For those residents living near the staging area or the travel corridor (Wilderness Park and Toklat Estates subdivisions and the Trail Lake Fish Hatchery) the helicopter noise would be loud and there would be a high chance of seeing a helicopter. About 1 percent of the Moose Creek travel corridor is within the foreground, 16 percent is in the mid-ground, and 22 percent is in the background, from the Moose Pass area. About 9 percent of the Snow Creek travel corridor is in the background; and about one percent of the Mt. Ascension travel corridor (includes the Mile 33.2 Gravel Pit staging area) is within the foreground, three percent is in the mid-ground, and three percent is in the background from Moose Pass area.

There would be little helicopter noise and a slight chance of local residents seeing a helicopter when it was using the Grandview, West Bench Peak, East Bench Peak, West Moose Creek, East Ptarmigan, Snow River, and Mt. Ascension units less than five percent of these units can be seen from the Moose Pass area. Most of the seen area is in the background.

Hope

There would be no helicopter noise or helicopter sighting from commercial guided helicopter skiing at Hope.

Seward

The only helicopter noise or helicopter sighting would be in the morning and the late afternoon when the helicopter was traveling between the Seward Airport and Mile 12.4 staging area. Less than one percent of the Snow River unit is visible from Seward.

To preserve the natural quite of the Exit Glacier area, helicopters exiting/entering from the Seward Airport or the Mile 12.4 staging area will not fly in the Resurrection River Valley corridor. There will be no flightseeing over Exit Glacier or Harding Ice Fields.

Sunrise

There would be a good chance for the helicopter to be seen and heard by local residents when the helicopter was using the West Seattle Creek unit. About four percent of the West Seattle Creek unit is visible from Sunrise (mostly mid-ground).

Alternative 3

The potential noise from the helicopter and the visibility of the helicopter would be similar to Alternative 2 except that:

Girdwood

There would no heli-skiing in the West Seattle Creek unit.

Moose Pass area

The Mile 33.2 Gravel Pit staging area near Moose Pass would not be used. There would be little helicopter noise and a slight chance of local residents seeing a helicopter when they were traveling to the Mile 12.4 staging area.

There would be little helicopter noise and a slight chance of local residents seeing a helicopter when CPG is operating in the Grandview, West Bench Peak, East Bench Peak, East Ptarmigan, Snow River, and Mt. Ascension units as less than five percent of these units can be seen from the Moose Pass area. Most of the seen area is in the background.

Sunrise

There would be no helicopter noise or helicopter sighting from commercial guided helicopter skiing at Sunrise.

Alternative 4

The potential noise from the helicopter and the visibility of the helicopter would be similar to Alternative 2 except that:

Because only two helicopters would be operating at one time, there would be less noise overlap.

Cooper Landing area

There would be no noise or helicopter sighting by local residents from commercial guided helicopter skiing.

Girdwood

The Seattle Creek travel corridor would not be used and there would no heli-skiing in the West Seattle Creek, Mid Seattle Creek, and East Seattle Creek units.

Moose Pass area

The staging areas at Mile 33.3 Gravel Pit (near Moose Pass) and Mile 12.4 would not be used.

There would be little noise from the helicopter and a slight chance of local residents seeing a helicopter when it is operating within the Grandview, West Bench Peak, and East Bench Peak units as less than five percent of these units can be seen from Moose Pass area. Most of the seen area is in the background.

Seward

There would be no helicopter noise or helicopter sighting by local residents from commercial guided helicopter skiing.

Sunrise

There would be no noise or helicopter sighting from commercial guided helicopter skiing at Sunrise.

Alternative 5

The potential noise from the helicopter and the visibility of the helicopter would be similar to Alternative 2 except that:

Girdwood

There would no heli-skiing in the West Seattle Creek or East Seattle Creek units.

Moose Pass area

The Mile 33.2 Gravel Pit near Moose Pass would not be used as a staging area. There would be little helicopter noise and a slight chance of local residents seeing a helicopter when it was traveling to the Mile 12.4 staging area.

There would be very little helicopter noise and a very slight chance of local residents seeing a helicopter when it was using the Grandview, East Bench Peak, East Ptarmigan, and Snow River units as less than five percent of these units can be seen from Moose Pass. There would be no heli-skiing in the Mt. Ascension unit.

Sunrise

There would be no helicopter noise or helicopter sighting by local residents from commercial guided helicopter skiing.

Alternative 9

The potential noise from the helicopter and the visibility of the helicopter would be similar to Alternative 2 except that:

Because only two helicopters would be operating at one time, there would be less noise overlap.

Cooper Landing area

There would be no noise or helicopter sighting by local residents from commercial guided helicopter skiing.

Girdwood

The Seattle Creek travel corridor would not be used and there would no heli-skiing in the West Seattle Creek, Mid Seattle Creek, and East Seattle Creek units.

Moose Pass area

The staging areas at Mile 33.3 Gravel Pit (near Moose Pass) and Mile 12.4 would not be used.

There would be little noise from the helicopter and a slight chance of local residents seeing a helicopter when it is operating within the Grandview, West Bench Peak, and East Bench Peak units as less than five percent of these units can be seen from Moose Pass area. All of the seen area is within the background.

Seward

There would be no helicopter noise or helicopter sighting by local residents from commercial guided helicopter skiing.

Sunrise

There would be no noise or helicopter sighting by local residents from commercial guided helicopter.

Weighted Populations

The populations of the communities were used to weight the visibility results in order to better understand the potential impact of activities on local communities. Weighting was used because communities have different populations. Thus, it would not be fair to give the same weight to Sunrise, with 13 residents, as to Seward, with 2,794 residents.

When viewed in terms of the weighed populations percentage (see Chapter 3, Issue 3), residents of Girdwood would be the most affected by helicopter noise and helicopter sightings. Helicopters using the Girdwood Airport as a staging area and the North Twenymile travel corridor would be readily heard and seen. In the Moose Pass area, helicopters would be readily heard and seen when using the Moose Creek travel corridor

and the Mile 33.2 Gravel Pit staging area. People living near the staging area would be affected the most. Helicopters would also be heard and seen in Sunrise when they used the West Seattle Creek unit.

Cumulative Effects

How one perceives sound is based on one's values, exposure, tolerance, and expectations. In the project area, the most noise comes from vehicles using the highways and from people inhabiting the valley bottom. The Seward Highway (was constructed in 1951, upgraded in the 1960s and rebuilt in 1998). In 2002, the Seward Highway average daily traffic count figures were 4,265 for Ingram Creek to Turnagain Pass, 4,050 for Turnagain Pass to the Hope cutoff, and through Moose Pass 1,770. In the winter (2001), an average of 600 vehicles travel through Moose Pass daily (Alaska Department of Transportation and Public Works 2002). Nearly 6,000 people live in or adjacent to the project area. Most the people live in Seward or Girdwood. Cooper Landing, Hope, Moose Pass, Sunrise are smaller communities. A few people live in homes or businesses scattered along the highway. All of these places generate noise-associated inhabitation.

During periods of good weather in the winter, several aircraft use the airstrips at Girdwood and Seward each day. The Cooper Landing airstrip has limited use. Alpine Air has a fixed wing/helicopter transportation service in Girdwood. They take backcountry skiers into a number of areas including the Bench Peak, "Punch Bowl", and Seattle Creek areas. Small fixed wing aircraft use Portage Pass as their primary travel route between Anchorage and Prince William Sound. Small planes use the Seward Highway corridor as a travel route between Anchorage and Seward.

The Alaska Railroad was started in 1902 and constructed from Seward to Fairbanks in 1915-1923. The railroad parallels the Steward Highway to Portage. Near Portage, the railroad leaves the highway and continues south to Moose Pass. There, it rejoins the highway and continues to Seward. It is adjacent to several of the heli-skiing units. The railroad does not use passenger cars of this section of the railroad outside the summer season, except for the special cars to take skiers to Grandview in March.

To protect the highway and railroad, under permit to the Forest Service, the Department of Transportation and Public Facilities conducts avalanche control work, as needed, throughout the winter at 18 gun-mounted or truck-mounted sites. The Alyeska Winter Sports Area also uses explosives for avalanche control.

CPG has a State of Alaska permit to conduct snow-cat skiing and helicopter skiing activities on Alaska Department of Natural Resource lands in the Winner Creek area. This permit includes an authorization for the use of explosives for avalanche control. In 2000 CPG guided 200 cat-skiers and 669 heli-skiers under this permit. From 2000 to 2003 CPG guided an average of 210 cat-skiers* and an average of 917 heli-skiers.

* Average includes 0 cat-skiers in 2003, due to snow conditions.

About 82 percent of the Kenai Peninsula Geographic area is available for winter motorized recreation (USDA- Forest Service, 2002a). Various levels of snowmachine users can be found throughout these areas. Turnagain Pass and Lost Lake areas are popular snowmachine use areas. Noise from snowmachines contributes to the over-all noise in the project area.

The helicopter noise from CPG's operations would be additive to the existing winter noise level. However, in most of the ski units there is little background noise, and therefore, the helicopter noise stands by itself, except for the noise of an occasional snowmachine, other aircraft, or avalanche control.

Air Quality

Effect of Alternatives

Under Alternative 1, No Action, CPG's permit would not be issued and there would be no effect to the ambient air quality from commercial heli-skiing. All of the action alternatives would have limited, short-term effect on the ambient air quality from aircraft emissions. The AStar A350 B2 helicopter (used by CGG) burns approximately 158 kilograms (351 pound or 7 gallons) of fuel per hour, and emits the following: (1) 28 grams (.06 pounds) per hour of unburned hydrocarbons; (2) 744 grams (1.6 pounds) per hour of carbon monoxide; and (3) 982 grams (2.2 pounds) of nitric oxide.

Based on the proposed 127 day operating season and an average of 9 hours of flight time per day one helicopter would burn about 8,000 gallons of fuel and emits the following: (1) 68 pounds of unburned hydrocarbons; (2) 1,882 pounds of carbon monoxide; and (3) 2,515 pounds of nitric oxide. Actual use is estimated to be about 50 percent of the maximum use. The average annual emission of a passenger car is (1) 80 pounds of unburned hydrocarbons, (2) 606 pounds of carbon monoxide, and (3) 41 pounds of nitric oxide. Table 4-3 shows the estimated fuel used and emissions based on the number of helicopters operating and the client days served, by alternative.

Table 4-3 Estimated Fuel Use and Emissions

	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 9
Fuel	0	12,000 gal	12,000 gal	8,000 gal	12,000 gal	6,000 gal
Hydrocarbons	0	100 lbs	100 lbs	70 lbs	100 lbs	50 lbs
Carbon monoxide	0	2,820 lbs	2,820 lbs	1,880 lbs	2,820 lbs	1,410 lbs
Nitric oxide	0	3,770 lbs	3,770 lbs	2,570 lbs	3,770 lbs	1,930 lbs

Cumulative Effects

In the winter, emissions from vehicles bringing recreationist into these areas contribute to the overall diminishment of air quality. Snowmachines also degrade the air quality within localized areas. Localized short-term high concentrations of carbon monoxide and other pollutants occur where snowmobile use is concentrated such as in the Turnagain Pass and Lost Lake areas. Helicopter skiing would add a very small

increment of pollutants to the existing air quality. Any cumulative effect would not be expected to substantially degrade long-term air quality.

Soil and Water Resources

While fueling helicopters there may be some slight spillage of fuel onto the ground. There is also a very slight risk of a major spill from fueling operations or from an accident involving the fuel truck. CPG would have standard fuel spill prevention, containment, and cleanup materials on hand at any fueling site and would maintain and follow a spill plan that includes spill prevention, containment, cleanup, and notification procedures. If fueling takes place within 50 feet of a wetland or water body, the fuel tank would be located within an impermeable containment basin.

Vegetation and Sensitive Plants

No vegetation would be affected by this proposal. The proposed activity would occur over snow and ice covered surfaces. Snow and ice cover would protect all potential sensitive plants and habitats from the proposed activities (see Appendix B).

Heritage Resources

Appendix B of the Programmatic Agreement between the Advisory Council on Historic Preservation, the State Historic Preservation Officer and the USDA Forest Service states that, "Activities taking place on glacial ice or permanent snow fields", or "Issuance of special use permits or other agreements where no more than one square meter of cumulative ground disturbance will occur and where no properties 50 years old or more are involved," have no potential to effect historic properties. Therefore, it is determined that the proposed heli-skiing proposal would have no effect to historic properties (USDA Forest Service 2002e).

Roadless Areas

Effects

Under Alternative 1, No Action, no permit would be issued to CPG and there would be no helicopter landing in inventoried roadless areas for heli-skiing. Under all action alternatives, heli-skiing would be authorized in inventoried roadless areas. Although heli-skiing would affect some wilderness values, such as solitude, sense of remoteness, primitive recreation, self-reliance, and untrammeled natural state, such impact would be temporary. Eliminating the use would reverse the impacts. Winter helicopter skiing would have little effect of character of the roadless environment. No facilities would be constructed and no tress would be cut. Heli-skiing would be a compatible use in inventoried roadless areas. Issuance of the proposed permit would not affect the status of the inventoried roadless areas.

There would be no cumulative effects on roadless areas and their potential for wilderness classification because there would be no activities that would alter the physical setting or degrade wilderness values. The proposed helicopter use would not have a permanent effect on the physical environment nor preclude the areas from being considered in the future for inclusion in the National Wilderness Preservation System.

Wild and Scenic Rivers

Effects

Under Alternative 1, No Action, no permit would be issued to CPG and there would be no helicopter landing in any area recommended for Wild and Scenic River classification. Under Alternatives 2, 3, 4, 5, and 9, helicopters could land in the West Twentymile unit. Under Alternatives 2, 3 and 4, helicopters could land in the West Bench Peak unit. Under Alternatives 2, 3 and 5, helicopters could land in the Snow River unit. Helicopter landings would not affect the rivers outstandingly remarkable values nor affect their classification, if they were to be added to the National Wild and Scenic River System.

Economics

CPG estimates that one client day provides \$650 in revenues. By using the maximum client days available, gross revenues from commercially guided heli-skiing would vary from a high of \$1,560,000 under Alternative 2 to a low of \$520,000 under Alternative 9 (800 client days). Alternative 3 (2,200 client days) would generate \$1,430,000, Alternative 5 (1,800 client days) would generate \$1,170,000, and Alternative 4 would generate \$780,000 (1,200 client days). Based on their financial information, CPG believes they need a minimum of 1,200 client days to achieve a profit, while the optimum, without additional capital expenditures, would be in the 1,800 to 2,400 client day range (CPG 2003). Most of the expenditures would occur in the Anchorage-Girdwood area.

Other sources of income to the community of Girdwood include: temporary housing for guides, hotel and restaurant use by clients, and other purchases from both guides and clients. In 2003 nine CPG's heli-ski guides resided locally and two came from out-of-state. During the same year 33% of CPG's clients were local residents and 67% came from out of state.

Environmental Justice

In accordance with Executive Order 12898, all action alternatives were assessed to determine whether they would have disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority or low-income populations. This assessment included any programs, policies, and activities being considered. No such impacts were identified during scoping or through the effects analysis.

Unavoidable Adverse Impacts

Potential adverse impacts are identified in this analysis. Most are minor, and could be mitigated through management and mitigation requirements. The exception is the impact of heli-skiing on some other backcountry recreationists, especially skiers. The other unavoidable impact specific to helicopter skiing is the noise of the helicopters. While the Kenai Peninsula is affected by numerous noise sources, the helicopters' noise would be a considerable impact to some recreations and local residences.

Irreversible and Irretrievable Commitment of Resources

No resources would be irreversibly committed under this proposal. The only irretrievable resource commitment under this proposal would be any forgone backcountry recreation opportunities that are replaced by heli-skiing. Since heli-skiing does not preclude any other recreational activity, no irretrievable commitment would be made by issuance of the permit.